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AUTHOR Winkler, Victoria H.
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ABSTRACT

The development and content of a freshman engineering program that stresses writing, speaking, and listening skills are described. In conjunction with writing expository essays and research reports, the students make demonstrations, deliver informative and persuasive speeches, and participate in panel discussions and debates. Videotaping, film-making, project directing, and studies in body language and nonverbal communication complete this multidimensional approach to learning by interfacing traditional freshman writing programs with innovative and practical problem-solving. (Author/MLH)

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COMMUNICATIONS FOR ENGINEERS: A MULTI-DIMENSIONAL APPROACH

Victoria M. Winkler

Assistant Professor of English and Humanities

University of Pittsburgh at Johnstown

Johnstown, PA 15904

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COMMUNICATIONS FOR ENGINEERS: A MULTI-DIMENSIONAL APPROACH

A four-pronged program stressing the development of reading, writing, speaking and listening skills forms the core of the communications program for freshman engineering students at the University of Pittsburgh at Johnstown. In conjunction with writing expository essays and research reports, the students deliver demonstration, informative and persuasive speeches, and they participate in panel discussions and debates. Video-taping, film-making, project directing and studies in body language and non-verbal communication complete this multi-dimensional approach to learning by interfacing traditional freshman writing programs with innovative and practical problem-solving techniques.

Development of the Program

N. Lewis Buck, Dean of Engineering Technology at the University of Pittsburgh at Johnstown, recognizes that engineers have a rare talent for perceiving the world graphically--in terms of systems and design; but they often have difficulty communicating their perceptions in oral and written forms to the various non-specialists that they encounter. One of the major causes of misunderstanding between the engineer and the layman stems from a breakdown in communications. When Professor Buck assumed the position of Dean of Engineering Technology in 1970, he began planning a two-term program for freshman engineering students which would concentrate on the development

of the communications skills. Dr. William T. Doncaster, Associate Professor of History, worked with Dean Buck to implement two four-credit freshman courses entitled "Communications for Engineers." Dean Buck and Dr. Doncaster agreed that the students should be exposed to a wide range of human experience through literature and that the discussion and analysis of literature should form the content of their writing assignments. Poetry, drama, novels, short stories and essays spanning ancient, medieval and modern literature were chosen to introduce the students to the basic values of Western civilization; furthermore, the discussions of these readings provided a forum for the analysis and evaluation of changing value systems in specific cultural and historical contexts. The results of the students' readings, discussions and research projects were presented to the class as informative speeches and expository essays. Related topics in the areas of current events and the student's special interests also became the subjects of their speeches and essays

In each of these two four-credit courses, the in-coming engineering students were taught a combination of expository writing skills and basic public speaking skills. The emphasis was placed on developing ease of expression and self-confidence, while learning and practicing the techniques necessary to communicate effectively with both formal and informal groups. Besides delivering four formal speeches each term, the student learned to express his ideas clearly, concisely and effectively in essays, written reports and research papers.

The writing and speaking assignments were often correlated in order to demonstrate to the student that most of the conventional introductory, supporting and concluding techniques employed by effective speakers are also standard techniques used by writers of essays and reports. While essays and speeches form the bulk of the performance aspect of the program, support activities, such as the development of reading and listening skills, were presented as important correlative skills, which lay the foundation for effective oral and written presentations. To indicate the correspondence between classroom activities and extra-curricular activities, the students in the communications program attended special lectures, live theater presentations and factory tours. Finally, the student judged to be the best freshman speaker by his peers and a panel of faculty judges delivered an informative speech at the annual Engineering Week Banquet.

When Ms. Victoria M. Winkler began coordinating the Communications for Engineers Program in 1973, the general format and objectives of the program remained the same; however, the students were now exposed to journal-keeping, letter-writing exercises, video-taping, non-verbal communication and student projects (aside from traditional research papers). These additional activities permitted the students and the instructors to explore more fully the reciprocal aspects of reading, writing, speaking and listening skills, while shifting the focus of the course from teacher-centered to student-centered instruction. Both the instructor and the student, according to Ms. Winkler, are viewed as co-learners in a workshop environment.

The workshop approach to learning promotes greater student response while providing ample opportunities for students to practice their developing skills.

In the following paragraphs, we will examine the methods and techniques used in developing reading, writing, speaking and listening skills in the Communications for Engineers Program.

Reading Skills

The majority of students entering college today are part of the "television generation"; and many of them are not serious readers. A steady diet of taped entertainment and "catchy" commercials has resulted in a generation of students with an aversion to reading and with minimal reading skills. Television, sports magazines and automobile magazines afford today's students a substitute for serious reading and its corollary functions of building vocabulary and serving as models of good writing. Since many science and engineering students are mathematically or mechanically oriented, they are even more predisposed to avoid reading any material that they do not deem of immediate practical value. Many freshmen find critical reading difficult because they have never developed adequate reading and comprehension skills. As a result of this deficiency, students often write poor essays either because they have nothing to say or because they are unable to develop an idea effectively. Writing cannot be taught in a vacuum, and form cannot be divorced from content; therefore, literature is essential for stimulating ideas, improving reading comprehension and providing models of good writing.

Since the subject of literature is the human condition and since writers reflect their own cultural biases concerning man's relationships with his fellow man, his God, his environment and himself, literature provides an excellent study of man and of his emerging and changing value systems. By reading and discussing selected works of poetry, drama and prose, the student can compare his own values with those of ancient and modern writers. He is taught to analyze, question and evaluate the effectiveness of one course of action as opposed to another under a given set of circumstances. In other words, the student is invited to think. By discussing the value systems of men in different historical eras and by comparing their ideas with his own, the student is encouraged to explore the effects of social, political, economic, religious and scientific movements in the crisis-encounter situations presented in literature. A critical look at man's past through literature may help the student to cope with the future--a future that he will be instrumental in shaping.

Elements of style as well as content are discussed by students, and selected passages serve as writing models. The students generally read four major works and two minor works per term. Although the reading assignments vary from term to term, the works are unified thematically. These readings represent different genres and span the ages in order to expose the student to a broad sample of literature. The selections are chosen both for their instructional value and for their appeal to the reader.

Writing Skills

Reading and writing skills are so closely integrated that it is difficult to discuss one without including the other. Limited vocabulary, poor spelling, the inability to develop ideas fully and the lack of clear, concise and effective sentences are problems that are symptomatic of poor readers. Students who exhibit such persistent writing problems are given individual attention in tutorial sessions, and all students who receive less than a "C" grade are required to rewrite their assignments. If a student has problems organizing material and developing ideas, he is asked to submit an outline with his essays; if a student lacks clarity of expression, he is requied to submit two rough drafts with his final copy to help the instructor to trace the development of his ideas and to determine how well the student recognizes his own strengths and weaknesses.

During the first term, the students progress from writing descriptive essays to describing a process to writing personal narratives and expository essays. During the second term, the student writes critical analyses, reports, proposals and two short research papers. The expository essays and research papers form the basis for the student's informative and persuasive speeches and for their panel discussions and debates. In lieu of writing a second research paper during the second term, the students may choose to work in small task forces on a group project. The project report is submitted to the instructor, and the project is presented to the class.

Since the second term includes a study of literature and film, the students often decide to write, direct, shoot and edit their own five-minute films as their class project. In some cases, the projects they complete are displayed during the annual Engineering Week activities. Students are also asked to submit proposals for their major papers and projects. In their proposals, they must include an introduction to the topic, a thesis statement, a definition of terms, a review of the resources available to them, a procedural statement and a justification.

Besides submitting formal papers, the student practices informal writing skills by keeping a journal for a period of six or eight weeks during the first term. In his journal, the student writes essays, reports or narratives on a daily basis in order to make written expression as routine an activity as speaking. When the student becomes accustomed to expressing his ideas in writing on a regular basis, the onus of sitting down, pen in hand, to write a formal essay is removed. The student is instructed to write in his journal for twenty minutes per day, four or five days per week, on any topic that interests him. Within six weeks, the student should be able to develop an idea into a 250-500 word essay with relative ease.

The journals also serve as a written dialogue between the student and instructor, in which they discuss ideas and explore topics of mutual interest. Joural-keeping not only offers the freshman student an outlet for expressing his mixed emotions about adjusting to

college life, but also permits the instructor to develop rapport with the student on an individual basis. Furthermore, the attention that the student receives on his journal entries stimulates the co-learning function of the communications workshop.

Journals are collected at two or three week intervals and are promptly returned with the instructor's comments. The entries are not graded, nor are they corrected like formal essays; instead, the instructor comments on the student's entries and encourages him to polish certain entries for class publication. In a workshop session, the students discuss grammar, usage, punctuation, spelling and effective ways of developing an idea. They then edit the entries that they intend to publish, type them on ditto-masters and distribute copies of their published entries to other members of the class. Students are asked to publish at least three entries per term, and they are graded on their published entries. Class discussions of published entries often lead interested groups of students to form task forces to study a particular problem and to organize a panel discussion to report their findings to the class. Through the publication of journal entries, the student becomes aware of the fact that he is writing not only for his instructor, but also for a larger audience; consequently, he feels the need to improve his writing skills because his peers will be reading and discussing his entries.

The bulk of the writing and speaking activities in the communications program for engineers is performance oriented. The knowledge

that a speech based on his essays will be delivered to the class encourages the student to choose interesting and informative topics and provides the student with practical experience in addressing groups. Just as many of the speaking assignments arise from formal essays, so, too, many of the essays result from ideas generated in the discussions of reading assignments. In this reciprocal context the integration of reading, writing, speaking and listening skills becomes apparent to the student.

Speaking Skills

Since many knowledgeable students have difficulty expressing their ideas verbally, they are taught the rudiments of public speaking as an important part of the communications program. One reason for incorporating public speaking in the communications program is to put the student at ease in speaking before formal groups by demonstrating effective speech-making techniques and by giving him ample opportunities for oral expression in the classroom. As the student gains confidence in his speaking ability, he learns to modulate his voice, to control his stage fright, to maintain eye contact and to use gestures and audio-visual aids effectively.

During the first term, the student is asked to deliver a two-minute extemporaneous speech beginning "My name is . . . ." In conjunction with his descriptive writing assignments, the student is required to describe a process and to deliver a five-minute demonstration speech using simple props. His expository essay assignments result in a five-minute informative speech and in a panel discussion on a

subject of general interest. During the second term, the student delivers an eight-minute informative speech, a five-minute persuasive speech and short extemporaneous speeches. He also serves on a four-man debate team. The student judged to be the best speaker in the freshman class delivers his informative speech at the annual Engineering Week Banquet, and he is presented an inscribed plaque in recognition of his speaking excellence. Student's speeches are usually either literary or semi-technical in nature, and the students often speak on current social issues, such as population growth, the depletion of world resources, the energy shortage, pollution and the environment.

The approach to public speaking in the communications program consists of a combination of the Dale Carnegie method of building self-confidence and a positive self-image and a traditional "rhetoric of public address" approach through which the student is exposed to various types of public address. During the course of the term, guest lecturers from both schools of speech-making address the students, and they attend lectures and demonstrations on body language and non-verbal communication. Each student is video-taped at least once per term. Some class sessions are also video-taped to afford the student the opportunity "to see himself as others see him," and to provide a practical lesson on effective and noneffective communication techniques. After each speech, students receive written critiques in which their strengths and weaknesses as speakers are analyzed, and all students are required to schedule conferences with their instructors during the first term to discuss their progress in the course.

Besides delivering prepared and extemporaneous speeches, each student is required to learn the basic format of business correspondence and how to conduct an interview. As part of his research assignment, the student writes a letter of inquiry to an individual or an agency requesting additional information on his research topic. He also requests an interview with a professional person who is familiar with the student's topic. The information that the student gathers during the interview is incorporated in his research paper. In this way, the student gains practical experience in gathering primary source materials and in conducting an interview, while making important contacts in the local professional community.

In addition to stressing the importance of individual achievement, teamwork is also stressed in panel discussions, debates and group projects. The freshmen are encouraged to develop oral and written skills while learning to work with others in a co-operative workshop environment. During the second term, the instructor becomes a guide and resource person, and the student assumes greater responsibility for organizing and presenting information for class discussion. Much of the literature studied during the second term reflects cultural, social and technological changes which profoundly affect man's relationship with his fellow man, his environment and his own self-image. The two-term four-credit sessions become a learning laboratory in which four interrelated skills are practiced to help the student to achieve a prescribed level of proficiency in reading comprehension, writing, speaking and listening skills. That both the instructor and

the students comprise a community of learners is empahsized more than the traditional teacher-student model.

Listening Skills

In "The Medium Is the Massage," Marshall McLuhan states that modern man has substituted "an eye for an ear" because of his emphasis on print technology. In other words, we are taught to believe "half of what we see and nothing of what we hear." McLuhan's statement emphasizes the differences between listening and hearing: effective listening is quickly becoming a lost art.

Listening to someone speak, correlating the information received, storing it and later recalling the data forces the student to become an active rather than a passive listener. All of the listening exercises which are practiced by the students in the communications program are attempts by the instructors to teach the students the art of listening. They are expected to retain a certain amount of information, to follow the speaker's argument, to recognize key words and phrases, to decide whether the speaker is making a logical or an emotional appeal and to be prepared to ask questions and evaluate the presentation. Furthermore, the students participate in exercises which indicate that the message "sent" and the message "received" are not always identical. Students are required to listen carefully to the speeches of guest lecturers and of other students, as well as to tapes and records; they then outline what they have learned in short critiques. The students also attend live theater presentations, selected films and factory tours; afterwards, they submit critical

analyses of these activities. Through a variety of aural exercises, the students are introduced to the discipline of listening, as well as to those of writing and speaking.

Effective Communication: A Combination of Skills

Speaking objectively, the purpose of teaching reading, writing, speaking and listening skills appears to be two-fold: (1) to meet the students' immediate needs by teaching them to communicate effectively with instructors and fellow students, and (2) to begin preparing them for the technical communications skills necessary in their profession. The assignments in the freshman communications program are designed to stimulate the student's awareness of the need for improved communications skills in all of his academic endeavors. Since no discipline exists independently of the others, the student is expected to integrate and modify the methods and communications skills that he learns in the "Communications for Engineers" courses to meet the requirements of his technical courses. However, the "spin off" value of the communications program is minimal without the active support and encouragement of the technical faculty. There is still a considerable amount of "lag" between the development of communications skills in the freshman year and their application in the technical curriculum. Insofar as the program teaches the necessary skills to meet the student's perceived needs, its value is instrumental: it is a means to an end. There is another dimension to the course, however, that we have neglected to discuss: its humanizing value.

While the student is being taught practical skills which will aid him in securing employment and in performing his professional duties, he is also being introduced to the humanities, both as a source of entertainment and as a barometer of social and cultural change. The intrinsic value of the course is immeasurable because it deals in intangibles, such as developing an appreciation of the arts, improving the quality of life, educating the student's sensibilities and helping him to find himself and his place in history. Subjective goals such as these are not found in any lesson plan, and they do not fit neatly under the educational rubric of "behavioral objectives"; nevertheless, they comprise the subtle humanizing value of the course. The communications instructors endeavor to teach their students that the learning process and the need for effective communications do not cease when the student leaves the classroom or the academic community; instead, the student is part of a world-wide community, and the development of communications skills, like learning itself, is a continuing activity.